RESEARCH ON THE FINANCING EFFICIENCY OF CHINESE STRATEGIC EMERGING INDUSTRIES

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ABSTRACT

After the financial crisis, the global economic growth is slow. The countries all over the world have begun to seek for the new commanding heights of the economic strategy, in order to support their national economic development. In such an economic environment, Chinese treats strategic emerging industries as a major strategic choice for the transformation of economic development mode, and the focus of the industrial structure transformation. In order to achieve a high effective financing in strategic emerging industries, promote the development of strategic emerging industry healthily, this paper uses Super-SBM model to measure the financing efficiency of the strategic emerging industries listed companies in China during 2011-2016. Besides, it analyses the factors, which influencing the financing efficiency with the method of multiple regression model. The result shows that: Generally speaking, Chinese strategic emerging industry listed companies are not achieve effective financing now, but overall financing efficiency is relatively high. Many enterprise internal factors affect financing efficiency, the scale, operating capacity and quality of enterprises have positive effect on financing efficiency, while improper financing structure will hinder the increase of financing efficiency.

Keywords: Strategic emerging industries, Financing efficiency, Super-SBM, Multiple regression analysis

1. INTRODUCTION

Since China's reformation and opening up, the level of political and economic culture has been rapidly improved, and the total economic output has been ranked second in the world. In that kind of booming economy environment, many problems also exposed to the public, for example, the development of the industrial structure is not reasonable, the regional imbalance of economic development, there is still a wide gap of technical level between China and developed countries

in most manufacturing industry, so that many advanced technologies still have to be imported abroad. In order to reverse this situation, the 18th CPC National Congress explicitly proposed to "promote the development of strategic emerging industries and advanced manufacturing industries healthily". Strategic emerging industries are the shape of technological revolution and industrial transformation, and they are the key areas for training new energy and developing new competitive advantages in the future. The financing methods of Chinese strategic emerging industries, like most Chinese businesses, mainly depend on external financing support, besides their own assets accumulation. However, because the strategic emerging industries have characters of a huge investment, long payback period, asset specificity, and big sunk costs, they are usually in a relatively passive position when raising funds. The financing environment of strategic emerging industries in Jiangsu is very severe. Under this background, it is extremely important for enterprises to use low cost and low risk mode to integrate funds and get higher profits, which is the key to the development of strategic emerging industries.

The basic content of financing efficiency can be defined as the ratio of input-output or the cost-income ratio. The research on the financing efficiency is MM's theorem based on the theory of financing. TJ Chemmanur, K Krishnan (2011) use the data of U.S. manufacturing industries, analyzed effect on the efficiency of the the private enterprise that arisen of introduction of venture capital, the results showed that the venture capital can improve the overall efficiency of private enterprises by increasing sales[1]. G Hovakimian (2011) found that, in times of recession, enterprises improve the financing efficiency of the internal capital market by increasing the funds allocation when external financing cost is high, it emphasized the benefits of internal financing, which external capital market can never have[2]. T Yinhua, Z Zhiqiang (2012) made a research on the efficiency of human capital financing. The results showed that many factors can have positive effects on the efficiency of enterprises, including the real ownership of corporate executives and executives, the structure of diversified boards and CEOs and so on[3]. M Carp, M Mironiuc (2012) used principal component analysis to study the financing efficiency of 80 listed companies in Bucharest stock exchange, and found that internal financing can make enterprises achieve the growth of financing efficiency mainly[4]. MFC Gomariz, JPS Ballesta (2014) use the sample of listed companies on the Spanish stock market from 1998 to 2008, financial report inspection and the debt maturity play an important role in improving financing efficiency, and the result showed that the efficiency of enterprises can be increased by improving the quality of financial reporting and reducing the duration of the debt. Through further study, they found that the less use of short-term debt can make higher quality of financial reporting[5]. M Toloo, A Kresta (2014) use the actual data of 129 different asset financing plans provided by the Bank of Czech and the leasing company, and using the method of DEA model to find the most efficient DMUs. By using this method, enterprises can identify the weaknesses of management efficiency, and put forward some countermeasures to improve the target[6]. K Kočišová (2015) evaluated the

efficiency of large commercial bank of Weiss Gerard from 2007 to 2013, and results showed that the average loan efficiency of these banks decreased gradually, enterprises' efficiency had an positive relationship with capital adequacy ratio and profitability, and negatively correlated with the proportion of non-performing loans[7]. B Diallo (2017) used DEA model to measure the efficiency of banks in various countries. The result showed that, in the era of crisis, banks' efficiency could lead to relaxation of credit constraints, and thereby increased the growth rate of economic dependent industries[8].

2. MEASUREMENT OF FINANCING EFFICIENCY OF STRATEGIC EMERGING INDUSTRIES

2.1 Super-SBM model

As we knew, traditional DEA model cannot eliminate the effect of undesirable output, and the SBM model's efficiency is limited in the range of 0-1 so that many effective DMUs can't be compared. Tone (2002) proposed the Super-SBM model, which can avoid the malpractices of models above. This paper use Super-SBM VRS model to analyze the efficiency of strategic emeriging industries, which eliminate the effects of scale efficiency. The model is shown below:

$$\min \rho_{SE} = \frac{1 + \frac{1}{m}\sum_{i=1}^{m}\frac{s_i^-}{x_{ik}}}{1 - \frac{1}{q}\sum_{r=1}^{q}\frac{s_r^+}{y_{rk}}}$$

$$\text{s.t.} \sum_{j=1,j\neq k}^{n} x_{ij}\lambda_j - s_i^- \leq x_{ik}$$

$$\sum_{j=1,j\neq k}^{n} y_{ij}\lambda_j + s_r^+ \geq y_{rk}$$

$$\lambda, s^-, s^+ \geq 0, \sum_{j=1,j\neq k}^{n} \lambda_j = 1$$

$i = 1, 2, \ldots, m; r = 1, 2, \ldots, q; j = 1, 2, \ldots, n (j \neq k)$ stands for relative efficiency value, we use X and Y as the input and output variables respectively, m and q is the number of input and output indicators respectively, and is weight vector, "、 stand for the number of input and output slack variables' values.

2.2 index selection and data sources

According to the basic connotation of financing efficiency, this paper makes full use of the existing research results and takes many factors into consideration to select input and output variables, such as the applicability of evaluating indicator, availability and operability. And then this paper selects total cost, surplus reserves, undistributed profits, capital reserves, non-current liabilities as input indicators, and selects gross revenue and net profit as output indicators. The specific evaluation index system of the strategic emerging industries' financing efficiency is showed as follows.

(1) Input indexes

The total cost mainly includes the cost of main business, sales and management. The index is used to measure the resources invested by the enterprise for production and management. The cost is one of the important determinants of the output, and it determines the profit and loss of the enterprise.

The surplus stock and undistributed profit are the legal accumulation of enterprise's profit in proportion, which is used to reflect the input index of the internal financing.

Capital stock refers to the accumulation fund of the enterprise in the course of operation, due to the reasons such as accepting donations, equity premium and revaluation of legal property. The capital reserve is not related to corporate earnings and has relationship with credits of capital, and its ownership is belong to investors. This paper uses this index to measure the scale of equity financing

The non-current debt is the long-term debt borrowed from the banks for the enterprises' investment, and it is an important index that can represent the debt financing.

(2) Output indexes

Gross revenue is the sum of economic benefits formed in the process of business operation. It reflects the situation and development ability of the enterprise. The more the gross revenue is, the greater possibility enterprises can acquire profit, so that these enterprise can achieve good development.

The net profit is the final result of the enterprises' management, which is the most direct embodiment of the enterprises' benefit.

Considering the similar macro environment of the listed companies, this paper pick out the listed

companies on the Shanghai stock exchange and the Shenzhen stock exchange, whose main business is strategic emerging industries. Considering the dynamic development of the enterprise, this paper removed the listed companies who are listed after 2011, lack of financial data and were treated as ST and *ST by China Securities Regulatory Commission(CSRC). Finally, this paper selects 50 enterprises' data from 2011 to 2016. As we know that , in DEA model , the number of DMU in the model is two times greater than the sum of the number of input-output indicators, and this paper's sample data is accord with the standard of DEA model. The data is derived from the Wind database.

2.3 Use Super-SBM model to calculate the value of financing efficiency

In this paper, the number of samples is in line with the requirements of DEA model. However, the values of input and output should be non-negative in DEA model, so that we have do to dimensionless process to data of input and output index.

$$a_{ij} = 0.1 + \frac{x_{ij} - x_{\min}}{x_{\max} - x_{\min}} \times 0.9$$

In the upper form, $a_{ij} \in [0,1]; x_{\max} = MAX(x_{ij}); x_{\min} = MIN(x_{ij}); i = 1, 2, \ldots, n; x_{ij}$ is original variables of the evaluation unit.

The original data is processed by formula above, and then put them into the Super-SBM model. In this paper, we use DEA-Solver Pro 5 software to calculate the financing efficiency of the listed companies in the past 2011-2016 years, the results are as shown in Table 1.

Table 1: 2011-2016 Financing efficiency of listed companies in strategic emerging industries

Stock Code	2011	2012	2013	2014	2015	2016
002315.SZ	1.011552	1.056484	1.045901	1.035425	1.040774	1.007721
300209.SZ	1.060142	1.080974	1.050402	1.043396	1.013243	1.058267
600522.SH	0.776031	1.021637	1.014282	1.041837	1.094177	1.267736
000919.SZ	0.700919	0.701114	0.767562	1.003099	0.755206	1.0224
002223.SZ	1.152906	1.184179	1.117893	1.128193	1.115355	1.053059
002262.SZ	1.156351	1.16567	1.133353	1.163938	1.010955	1.079429
600513.SH	1.1911	1.133379	1.056527	1.040482	1.016314	1.022397
600557.SH	1.062751	1.143746	1.108403	1.065811	1.083436	1.078403
002080.SZ	1.043607	0.698744	0.709132	0.748435	1.00882	0.694749
002201.SZ	0.999356	1.004648	1.004703	1.039791	0.893117	0.879652
002450.SZ	0.924624	1.158015	1.217079	1.431963	1.160361	1.187064

002585.SZ	1.031271	0.639042	0.685319	0.71886	0.652356	0.694727
300128.SZ	1.044434	1.271825	1.179899	1.122433	1.144631	1.164899
300160.SZ	0.899376	0.818473	0.813945	0.84209	0.909099	1.011345
300169.SZ	0.901435	1.008852	1.011237	1.015888	1.014235	1.002488
300196.SZ	1.013343	1.019105	0.955665	1.025447	1.012318	1.022207
000738.SZ	1.0742	1.026153	1.006153	0.795425	0.853896	0.824349
002530.SZ	1.002289	1.022581	1.013466	0.999884	1.021095	0.791691
002559.SZ	0.843726	0.816965	0.811285	0.803876	0.848476	0.880245
300280.SZ	1.054995	1.046919	1.039033	1.039941	1.034719	1.056156
002409.SZ	1.028889	1.007419	0.902455	0.843098	0.865283	0.861838
601890.SH	0.765148	0.642157	0.662473	0.743755	0.865728	0.762541
600268.SH	1.001991	1.01209	1.005821	1.011815	1.03444	1.045416
000418.SZ	1.294436	1.067311	1.053483	1.084562	1.77346	1.21055
000551.SZ	0.600713	0.583727	1.0989	0.711209	0.764444	0.833165
000581.SZ	1.267613	1.087301	1.089636	1.280307	1.208881	1.20471
002090.SZ	0.920202	0.820972	0.849628	0.881257	0.895804	0.888069
002255.SZ	0.757179	0.75434	0.698614	0.670182	0.731207	0.747081
002367.SZ	1.007295	0.840795	0.907401	1.021349	1.084093	0.910101
002380.SZ	1.003838	0.998686	0.917651	0.947174	1.001399	1.00606
002499.SZ	0.902865	0.876757	0.90762	0.890396	0.977817	0.998332
300091.SZ	0.835953	0.740707	0.841426	0.871597	0.930077	1.032082
300152.SZ	0.846985	0.850646	0.775368	0.762525	0.859124	0.729699
300172.SZ	0.935649	0.932962	0.978728	1.054042	1.021276	1.059973
300190.SZ	1.003807	1.034031	0.969879	1.016874	1.027166	0.788713
600305.SH	0.999844	1.016899	1.014814	1.012213	1.043112	1.011306
600406.SH	1.330069	2.021844	1.399446	1.1629	1.116684	1.091872
600475.SH	1.019876	0.617043	1.013118	1.003715	1.010658	1.034495
600481.SH	1.197802	1.025887	1.005446	1.047491	1.149522	1.093681
600746.SH	1.027997	1.031012	1.047484	1.047354	1.07687	1.100949
600770.SH	0.532002	0.99921	0.999724	1.040883	1.041923	1.046872
601100.SH	1.083577	1.057272	0.775833	0.656839	0.628816	0.640402
000727.SZ	1.253796	1.201422	1.184315	1.150351	1.11412	1.073205
000777.SZ	0.622592	0.667768	0.720875	0.762529	0.842595	0.859839
002221.SZ	1.331938	1.449821	1.58752	1.605889	1.698924	1.520735
002531.SZ	0.849274	0.926947	0.811532	0.777171	0.904459	0.941401
600584.SH	0.612925	0.595978	1.002213	1.007176	1.0124	1.101166
601218.SH	0.594906	0.473187	0.601942	0.655693	0.734408	0.772207
601222.SH	0.924459	1.020102	1.042266	1.005999	1.001669	0.710066
002623.SZ	1.053251	0.746722	0.747558	0.703044	0.756337	0.69465
Average	0.971026	0.96239	0.967088	0.970712	0.997106	0.971403

As we can see form the table above, in the past 6 years, the financing efficiency of 50 listed companies in strategic emerging industries has not been realized effectively, but the average efficiencies are almost close to 1, with a mean value of 97.3%, which means that these companies have an average of 2.7% ineffective investment in 6 years. In the past six years, the average efficiency of financing has ups and downs, and the fluctuation is not large. There is no obvious improvement in these enterprises. We can concluded that the overall financing efficiency of strategic emerging industries has not been significantly improved, so these enterprises have to pay attention to the financing management of the whole industry. At the same time, 16 enterprises whose financing efficiency is 1 or more, that is, 32% of the strategic emerging industries listed companies achieve effective financing status. Therefore, the overall financing efficiency of strategic emerging industries needs to be further improved.

3. ANALYSIS OF FACTORS AFFECTING THE FINANCING EFFICIENCY

As we all know that, the macro environment can not be controlled or changed by the enterprises, so this paper focus on the internal perspective to study the factors at the micro level. This paper analyze the direction and degree of the internal indicators' impact on financing efficiency by building multiple regression models, and puts forward corresponding suggestions to improve these listed companies' financing efficiency of the strategic emerging industry.

3.1 Selection of indicators

Considering the internal factors that affect the development of strategic emerging industries comprehensively, based on the research results of previous scholars, this paper choose five independent variables to analyze its impact on financing efficiency, including enterprise scale, ownership structure, capital structure, enterprise quality and operational capacity. In this paper ,we use total assets to indicate the scale of the enterprise, use proportion of the first major shareholders to represent share structure, use asset liability ratio to measure the capital structure, use the ratio of current liabilities to total liabilities to represent the quality of the enterprise, and finally, we use turnover of total capital to measure enterprises' management ability. The specific definition is shown in the following table:

Table 2: Selection and description of independent variables

Variables	Definition	Name	Computing method
Enterprise scale	Total assets	SIZE	Natural logarithm
ownership structure	The proportion of the first big shareholders	SHARE	——
capital structure	Asset liability ratio	DA	Total liabilities / total assets
Quality of financing	Ratio of current liabilities	CD	Total current liabilities / liabilities
Operational capability	Total asset turnover	TAT	Net profit / average asset total

All the data are from listed companies' annual report in Wind Database.

3.2 Model construction and analysis

In this part, we will put the financing efficiency obtained by Super-SBM model above and independent variables into the multiple regression model to analyze these factors affecting the financing efficiency. The multiple regression model is constructed as follows:

$$FE_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 SHARE_{it} + \beta_3 DA_{it} + \beta_4 CD_{it} + \beta_5 TAT_{it} + \varepsilon_{it}$$

In the above formula, are the coefficients of each variables, and represents the residual term. Besides, i is each listed company of strategic emerging industries, and t represents the year.

Based on the model and data above, the multiple regression analysis is carried out by software Eviews 7.1, and the results are shown as follows:

Table 3: Results of multiple regression analysis

Variable	Coefficient	Std. Error	z-Statistics	Prob.
	0.747815	0.130022	5.751443	0***
SIZE	0.370937	0.090473	4.099982	0***
SHARE	0.043412	0.089046	0.787516	0.14259*
DA	-0.020632	0.066655	-1.709526	0.07569**
CD	0.153387	0.087272	1.757586	0.0788**
TAT	0.286722	0.044667	6.419045	0***

Remark: * * *, * *, * represented these variables are at 1%, 10%, and 15% confidence levels respectively.

From the results above, we can see that the regression coefficients of enterprise scale, financing quality and operation ability are positive and statistically significant, indicating that enterprises can increase the input of these three factors to improve the strategic emerging industy's financing efficiency. Specifically, larger scales these companies have, the ways of financing and financing

capital these companies have are more advantageous than small scale enterprises, it is more reasonable and scientific for large companies to use money, and the overall financing efficiency is relatively high. As far as the quality of financing is concerned, enterprises with higher short-term debt ratio are relatively high in quality, so that they can get better financing efficiency. For operation ability, the operating ability of a listed company is reflected by the use of existing assets to acquire maximized profits, this paper use turnover of the total to represent operation ability, indicating that the more the enterprise sells, the faster the capital turnover is, and the higher the overall profit rate is, so that the higher the financing efficiency is..

The regression coefficient of capital structure is negative and statistically significant, which indicates that the higher the asset liability ratio is, the more difficult it is to improve the enterprise's financing efficiency. At present, the policy and commercial loans are all increased to offer more suppot to strategic emerging industries listed companies, but due to the characteristics of strategic emerging industry, such as long period of return on investment, great risk and so on, it is difficult for enterprises to repay capital with interest on time when these enterprises have high asset liability ratio, which will lead to management crisis due to insufficient cash flow. It has negative effect on the development of enterprise long-term stable, although the influence degree is small, it still need to cause the attention of listed companies. The regression coefficient of equity structure is positive, but it is not significant enough, so its impact on the efficiency of financing needs to be further tested.

4. CONCLUSIONS

In this paper, we measure the financing efficiency of the listed companies of strategic emerging industries by constructing the Super-SBM model, and found that, in the last six years, the financing efficiency of the strategic emerging industries in is not fully realized, only 32% of the enterprises are effective in financing, but the overall financing efficiency of the industry is relatively high. And then , we analyze the factors affecting the financing efficiency of strategic emerging industries by using multiple regression analysis model, and find that the scale of enterprises, financing quality and operational capacity are positively related to the efficiency of corporate financing, while capital structure is negatively correlated with asset liability ratio and monthly financing efficiency.

Based on the conclusion above, we propose suggestions to improve Chinese strategic emerging industries from three aspects:

(1) Improve the management ability of enterprise

In order to strength the ability of survival and development of the enterprises, first of all, we

need to improve the management system within the enterprise from the top to the bottom. The limited management level of enterprises will not be able to realize the effective allocation of enterprise resources. Input can't get enough output, enterprises will be eliminated by the market competition mechanism. While perfect internal management system can help enterprises control costs, improve efficiency, maintain strong business competitiveness in the market from two aspects of income and cost. The study found that the capital structure of the listed companies and the quality of financing have an import impact on the efficiency of financing. The high asset-liability ratio of listed companies is not conducive to raising the financing efficiency, while higher ratio of short term debt can embody the positive development of the enterprises, thus these enterprises can get external financing from financial institutions easily, such as banks. Finally, efficient capital utilization can reduce the unnecessary cost of the enterprises, once these company's unnecessary cost expenditures are reduced, it will have a positive impact on capital turnover and indirectly improve product quality, thereby financing efficiency can be improved. In summary, the improvement of the enterprise's management ability plays an important role in the process of improving financing efficiency for these listed companies in Chinese strategic emerging industries.

(2) Optimizing policy support for strategic emerging industries

Although there is not much research on the influence of macro factors on financing efficiency, But in China's present macro environment, the government's related policy support has an important impact on the development of strategic emerging industries. Therefore, it is important for enterprises to get as much support as possible from the government and relative polices. On the one hand, the government should draw up reasonable plans to induct the industries' development combining with practical situation, so as to help the strategic emerging industries develop towards a healthy and smooth way and achieve the rational allocation of social resources. When the government design relevant policies, they should strengthen the support for small and medium strategic emerging industries when pay attention to the interests of the whole, in order to promote comprehensive development of strategic emerging industries. On the other hand, the government should give more subsidies to the research funding of strategic emerging industries. This measure can reduce the operating pressure and business risk of strategic emerging enterprises, at the same time, it can enhance the science and technology international competition by increasing investment in scientific research. Of course, the relevant government departments have greatly increased capital investment to the strategic emerging industries for capital investment, but they still should strengthen supervision and scrutiny in order to avoid national assets wastes.

(3) Improve the development of the financial market

The enterprises in the modern capital market mainly do financing from the financial market, and the development of China's strategic emerging industries is inseparable from the support of the financial market. Therefore, from the aspect of improving the credit system level of financing institution, we should consolidate and deepen the links and cooperation among various related institutions, such as government, enterprises and banks and so, so as to build a good credit rating system. Small and medium sized enterprises that are not easy to get large amount of loan from banks because they can't provide enough asset as security to guarantee the security of funds for enterprises and financial institutions. In addition, the single financing channel can not meet the strategic emerging industries' demand, it is necessary to establish the diversified market system, promote the realization of multi-channel financing methods, such as equity, bond financing and so on, so that enterprises can choose proper financing schemes according to their own actual situation.

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